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College Senate Resolutions

1-30-2005

Mathematics: Changes to the Mathematics Major

The College at Brockport, College Senate

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SUNY BROCKPORT

College Senate
State University of New York
College at Brockport
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Brockport, NY 14420-2925
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Resolution # 08
2005-2006
COLLEGE SENATE

COLLEGE SENATE
SUNY College at Brockport
FEB 15 2006
350 New Campus Drive
Brockport, NY 14420-2925

TO: Dr. John R. Halstead, College President

FROM: The College Senate Meeting on: ***January 30, 2006***

RE: ⇨ I. Formal Resolution *(Act of Determination)*
II. Recommendation *(Urging the Fitness of)*
III. Other, For Your Information *(Notice, Request, Report, etc.)*

SUBJ: ***Changes to the Mathematics Major*** *#22 05-06UC*

Signed: _____ Date: 2/6/06
(Dr. Mark Noll, 2005-2006 College Senate President)

Please fill out the bottom portion and return document to the College Senate Office.

TO: The College Senate

FROM: College President

RE: ⇨ I. Decision and Action Taken on Formal Resolution (circle)
a. Accepted. Resolution Effective Date: 2/10/06
b. Deferred for discussion with the Faculty Senate on ____/____/____
c. Unacceptable for the reasons contained in the attached explanation

II, III. Response to Recommendation or Other/FYI
a. Received and acknowledged ____/____/____
b. Comment: _____

DISTRIBUTED BY PRESIDENT'S OFFICE TO: President's Cabinet

DISTRIBUTE ALSO TO: Originator, Academic Advisement, Registrar (as appropriate)

Signed: _____ Date: 2/10/06
(College President, SUNY College at Brockport)

COLLEGE SENATE OFFICE
RESOLUTION PROPOSAL COVER PAGE

Routing Number	#22 05-06 UC

ROUTING NUMBER TO BE ASSIGNED BY SENATE OFFICE

DEADLINE FOR SUBMISSIONS: FEBRUARY 23

Proposals received after the deadline may not be reviewed until next semester.

INSTRUCTIONS:

- Submit proposals individually rather than packets with multiple documents.
- Complete this cover page for each proposal (available online at www.brockport.edu/collegesenate)
- Prepare proposal in Word format using committee guidelines (available online)
- Submit proposal electronically with this cover page to senate@brockport.edu, facprez@brockport.edu
- All updates must be resubmitted to the Senate office with an updated cover page, use routing number
- Questions? Call the Senate office at 395-2586 or the appropriate committee chairperson.

1. PROPOSAL TITLE:

Please be somewhat descriptive, for example, *Graduate Probation/Dismissal Proposal* rather than *Graduate Proposal*.

CHANGES IN MATHEMATICS MAJOR

2. BRIEF DESCRIPTION OF PROPOSAL:

Addition of one required course, MTH 255 Ordinary Differential Equations, in the current "Traditional Track" of the Mathematics Major.

3. SUBMISSION & REVISION DATES: PLEASE DATE ALL UPDATED DOCUMENTS

First Submission	Updated on	Updated on	Updated on
DEC 12, 2005			

4. SUBMITTED BY: (contact person)

Name	*Department*	*Phone*	*Email*
PIERANGELA VENEZIANI	MATHEMATICS	Ext 5485	PVENEZIA@BROCKPORT.EDU

5. COMMITTEES TO COPY: (Senate office use only)

Standing Committee	*Forwarded To*	Date
__ Enrollment Planning & Policies	Committee Chair	12/7/05
__ Faculty & Professional Staff Policies	Executive Committee	12/8/05
__ General Education & Curriculum Policies	Senate Floor	12/12/05
__ Graduate Curriculum & Policies		2/2/06

__ Student Policies XX Undergraduate Curriculum & Policies	College President Other	

(ROUTING NUMBER WILL BE A CHRONOLOGICAL NUMBER SEQUENCE FOLLOWED BY COMMITTEE INITIALS)

The Department of Mathematics proposes **changes in the Mathematics Major**:

(a) the addition of one required course, MTH 255 Ordinary Differential Equations, in the current "Traditional Track" of the Mathematics Major.

CHANGES IN THE MATHEMATICS MAJOR

COMPARISON BETWEEN OLD AND NEW PROGRAM

Students majoring in Mathematics who follow the "Traditional Track" will now have to complete a minimum of 39 credits in mathematics and four credits in computer science as illustrated below. This represents a new required course (MTH 255) in differential equations.

Existing Math Major: "Traditional Track"	***Credits***	***Proposed Math Major: "Traditional Track"***	***Credits***
REQUIRED COURSES:	**31**	**REQUIRED COURSES:**	**34**
MTH 201,202,203 Calculus I-III	9	MTH 201, 202, 203 Calculus I-III	9
		MTH 255 Differential Equations	3
MTH 281 Discrete Math I	3	MTH 281 Discrete Math I	3
MTH 324 Linear Algebra	3	MTH 324 Linear Algebra	3
MTH 346/446 Prob & Stat I, II	6	MTH 346/446 Prob & Stat I, II	6
MTH 425 Modern Algebra	3	MTH 425 Modern Algebra	3
MTH 457 Real Analysis	3	MTH 457 Real Analysis	3
ELECTIVE COURSES:	**9**	**ELECTIVE COURSES:**	**9**
MTH electives at 400-level*	9	MTH electives at 400-level*	9
MAJOR COREQUISITE		**MAJOR COREQUISITE**	
CSC 203 Fund of Comp Science	4	CSC 203 Fund of Comp Science	4
TOTAL CREDITS	**40**	**TOTAL CREDITS**	**43**

*CSC 483 may be substituted for one of these MTH elective courses.

One possible sequence of mathematics courses in the proposed Traditional Track of the Mathematics Major is displayed in the following table:

	FALL SEMESTER	***SPRING SEMESTER***
Freshman	MTH 201 Calculus I	MTH 202 Calculus II MTH 281 Discrete Math I
Sophomore	MTH 203 Calculus III CSC 203 Fund of Comp Sci I	MTH 255 Ord Differential Equations
Junior	MTH 324 Linear Algebra	MTH 425 Modern Algebra

	MTH 346 Probability & Statistics I	MTH 446 Probability & Statistics II
Senior	MTH 457 Real Analysis MTH elective	MTH elective MTH elective

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The number of credits required to complete a minor in Mathematics would not increase, though students would be able to take Differential Equations as one of their electives.

MINOR IN MATHEMATICS

Minor in Mathematics	***Credits***
MTH 201, 202 Calculus I, II	6
MTH elective courses *	12
Total number of credits	**18**

*12 credits in mathematics, chosen from MTH 203, MTH 255, MTH 281, MTH 245 or courses numbered MTH 324 or above. Students should choose these electives after consultation with an advisor from their major department as well as with a mathematics faculty member. At least nine credits toward the minor must be completed at SUNY Brockport.

The number of credits required to complete a minor in Mathematics/Statistics would not increase, though students would be able to take Differential Equations as one of their electives.

MINOR IN MATHEMATICS/STATISTICS

Track A	***Credits***
MTH 201,202,203 Calculus I-III	9
MTH 281 or MTH 245 Discrete Math I or Finite Math	3
MTH 346,446 Prob & Stat I, II	6
Total number of credits	**18**
Track B	***Credits***
MTH 201, 202 Calculus I, II	6
MTH 281 or MTH 245 Discrete Math I or Finite Math	3
MTH 346 Prob & Stat I	3
MTH 441,442 Stat Methods I, II	6
Total number of credits	**18**

COMPARISON WITH OTHER SUNY INSTITUTIONS

Statistics about the profile of mathematics majors in all SUNY schools granting a Bachelor of Science are provided in the table below.
Results can be summarized as follows.

1. The average minimum number of credits needed to major with a Bachelor of Science in Mathematics is 48.
2. Fifty percent of the schools offering a BS in mathematics require Differential Equations. In the remaining 50%, the course has to be chosen among a short list of requirements.

BS granting Institutions	Minimum number of credits	Additional requirements	Differential Equations course as core requirement?
Albany	42	Minor in atmospheric science, biology, business, chemistry, computer science, economics, electronics, geology, or physics.	N
Binghamton	45		N
Buffalo	51		Y
Cortland	42		N
Fredonia	45 or 46		Y
New Paltz	61		Y
Old Westbury	48		Y
Oswego	51-56 for BS in applied math		N
Plattsburgh	50		N
Stony Brook	45-49		Y

BA (only) granting Institutions	Minimum number of credits	Differential Equations course as core requirement?
Geneseo	41-43	N
Oneonta	36	N
Oswego	42-47	N
Potsdam	33	N
Purchase	44	N

RATIONALE FOR REQUIRING DIFFERENTIAL EQUATIONS

The Mathematical Association of America (MAA) has established guidelines to help mathematics department revitalize their curriculum in order to achieve the reforms needed to educate students in an increasingly technological environment. A course in Differential Equations is listed among the requirements of the first two years of undergraduate education. The rationale for the inclusion of a Differential Equations course among the core

courses is that, by doing so, the following essential and much needed goals may be achieved. The student will

1. **Encounter a topic that is of recent origin and current interest, showing the vitality of mathematics and its continuous growth.**
2. **Be able to make key interdisciplinary connections with the other sciences that use differential equations as a modeling tool.**
3. **Experience applying knowledge from other branches of Mathematics (such as calculus and linear algebra).**
4. **Be exposed to real life applications and gain appreciation of mathematics as modeling tool.**

The MAA recommendations were endorsed by the National Council of Teachers in Mathematics, the National Research Council, and the National Science Foundation.

COMPARISON WITH MODEL PROGRAMS

The Mathematical Association of America (MAA) has urged colleges and universities to respond aggressively to the changing needs of their students. In particular, all mathematics departments should prepare students to use mathematics in a technological environment, interpret models, and represent mathematical information in several ways, and use different methods to solve problems. Therefore departments should review and adjust their curriculum to reflect the pervasive use of technology in each discipline and in the workplace. It is recommended that departments should adopt teaching methods that include laboratory sessions and assignments using computer software or graphing calculators, group activities fostered by technology, and use of the Internet. The MAA recommends that special emphasis be placed on giving prospective teachers the experience of learning mathematics using, or adapting, methods practiced in the schools and on educating them to be leaders in the effective use of technology in the schools. Prospective teachers currently represent the majority of our mathematics majors.

Also, in the report *Undergraduate Major in the Mathematical Sciences*, the Committee on the Undergraduate Program in Mathematics (CUPM) of the MAA has made recommendations to guide mathematics departments in designing curricula for their undergraduate students. Among the seven fixed components that form the curricular structure of the mathematical sciences major, there is a differential equations course.

Finally, in 1987 the National Science Foundation (NSF) decided to encourage initiatives to reform the calculus curriculum. Highlights of the NSF reform initiative included:

1. Emphasis on conceptual understanding over rote memorization.
2. Utilization of technology, instead of drilling symbol manipulations by hand.
3. Emphasis on connections to outside, work diverse real problems.

EVIDENCE OF DEMAND FOR THE NEW FOCUS

The Mathematics Department has discussed with client departments its plans to introduce a 200-level Differential Equations course. Dr Mancuso, Chair of the Physics Department, Dr Lakshmanan, Chair of the Computer Science Department, and Dr Zollweg, Chair of the Earth Sciences Department, have all shown strong support for the change.

RESOURCES

The software packages MAPLE, MATLAB, and Mathematica, already available on campus machines, will be used in MTH255.

COMPETITION FROM OTHER ROCHESTER AREA COLLEGES

The mathematics major programs at area colleges all follow the above-mentioned guidelines set by the MAA.

RIT core curriculum includes a course in differential equations. The foundation requirements for mathematics majors at the University of Rochester include a semester of study of ordinary differential equations. Nazareth College has a mathematics major program that consists of 40 hours of mathematics including a 3-credit differential equations course as well as an additional semester of a programming language and two semesters of physics.

If the change were to be implemented, the Mathematics Department at SUNY Brockport would still offer a major program with the lowest number of credits necessary to graduate with a major in mathematics among the fore-mentioned schools.
